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Applicant:	Takashi Ihara	)
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AMENDMENTS TO THE CLAIMS UNDER PCT ARTICLE 19

Mail Stop PCT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Attached is the English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3).

Respectfully submitted,

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What is claimed is (Amended under Art. 19, PCT):

1. An antenna structure which receives a radio wave to be used inside a metal outer casing, said antenna structure being characterized by having a structure wherein a coil is wound about a magnetic core and being able to receive a magnetic flux from outside said metal outer casing.

2. An antenna structure which receives a radio wave to be used inside a metal outer casing, said antenna structure being characterized in that said antenna structure comprising a main magnetic path in which a coil is wound about a magnetic core and a sub-magnetic path in which said coil is not wound about said magnetic core, said magnetic path formed along said magnetic core having a configuration similar to a closed loop like configuration, a gap is provided in a part of said magnetic path of said antenna structure forming said closed loop like configuration, said gap portion of said magnetic path is configured to have magnetic resistance or magnetic permeability being different from tat of other parts of said magnetic path, and said antenna structure has a structure wherein a magnetic flux coming from outside said metal outer casing, can be received but said magnetic flux generated by resonance hardly leaks to an outside of said magnetic path.

3. An antenna structure according to claims 1 or 2, wherein said magnetic resistance of said sub-magnetic path is configured so as to be larger than that of said magnetic resistance of said main magnetic path.

4. An antenna structure according to any one of claims 1 to 3, wherein a material different from said material forming said magnetic core is configured to be arranged inside of said gap.

5. An antenna structure according to any one of claims 1 to 4, wherein said gap is filled with a material different from said material forming said magnetic core.

6. (Amended) An antenna structure according to any one of claims 1 to 4, wherein said gap is an air gap.

7. An antenna structure according to claim 6, wherein said air gap is formed by inserting an intervening spacer within said gap.

8. An antenna structure according to any one of claims 1 to 7, wherein said antenna structure receives said radio wave including a long wave whose frequency is not more than 2000 KHz.

9. An antenna structure according to any one of claims 1 to 8, wherein said metal outer casing is formed by at least one member which is selected from a structure being capable of storing said antenna structure inside thereof and comprising a side section and a bottom cover section each of which being made of a metal material , respectively and a structure being capable of storing said antenna structure inside thereof and comprising a piece of metal member in which a side section and a bottom cover section being integrally formed into one piece member.

10. An antenna structure according to any one of claims 1 to 9, wherein a cross section of said main magnetic path is different from that of said sub-magnetic path.

11. An antenna structure according to any one of claims 1 to 10, wherein a material of said main magnetic path being different from that of said sub-magnetic path.

12. An antenna structure according to any one of claims 1 to 11, wherein effective permeability of said sub-magnetic path is configured so as to be smaller than that of said main magnetic path.

13. An antenna structure according to any one of claims 1 to 12, wherein a film layer selected from a group consisting of a magnetic transmuted film layer, a non-magnetic film layer, and a film layer having low magnetic permeability, is formed on at least a part of a surface of said sub-magnetic path or of said main magnetic path.

14. An antenna structure according to any one of claims 1 to 13, wherein said main magnetic path and said sub-magnetic path form the unit members, respectively and each being independent from each other, and said main magnetic path and said sub-magnetic path are integrally connected with each other, after said coil is wound about said main magnetic path.

15. An antenna structure according to any one of claims 1 to 14, wherein said gap is formed in at least one of connected portions formed between said main magnetic path and said sub-magnetic path.

16. An antenna structure according to any one of claims 1 to 14, wherein said gap is formed in a part of said sub-magnetic path.

17. An antenna structure according to any one of claims 1 to 16, wherein a connected surface of said gap, which is provided in said sub-magnetic path, or a connected surface formed between an end face of said main magnetic path and an end face of said sub-magnetic path, forms with a tapered configuration.

18. An antenna structure according to any one of claims 1 to 17, wherein said gap is formed by either one of ways in which the end faces of said main magnetic path and said sub-magnetic path being oppositely arranged to each other or a part of a surface of a portion of said sub-magnetic path and a part of a surface of other portion thereof, each of said surfaces being ones other than said end surfaces of said sub-magnetic path, being oppositely arranged to each other.

19. An antenna structure according to any one of claims 1 to 18, wherein said gap is formed in a portion where at least a part of said main magnetic path and at least a part of said sub-magnetic path are adjacently arranged to each other while in parallelism with each other.

20. An antenna structure according to any one of claims 1 to 19, wherein said gap is formed in a portion of said magnetic pass except for a portion in the vicinity of a portion of said main magnetic path on which a coil is wound.

21. An antenna structure according to any one of claims 1 to 20, wherein said gap includes a member whose magnetic resistance differs from said magnetic resistance of a material forming said magnetic path.

22. An antenna structure according to any one of claims 1 to 21, wherein said gap is filled with a member which is the one selected from a group consisting of a non-metallic and a non-magnetic material, and a non-metallic and magnetic transmuted material.

23. An antenna structure according to any one of claims 1 to 22, wherein said main magnetic path or said sub-magnetic path is made of a soft magnetic material.

24. An antenna structure according to any one of claims 1 to 23, wherein said main magnetic path is arranged so that said main magnetic path takes a position at which said main magnetic path directly facing to a direction from which said radio wave would come, with respect to said sub-magnetic path, so that said main magnetic path mainly can receive said radio wave rather than said sub-magnetic path can do.

25. An antenna structure according to claim 24, wherein a length of said main magnetic path is configured to be longer than said length of said sub-magnetic path, thereby said main magnetic path is arranged so as to cover said sub-magnetic path so that said sub-magnetic path is not directly opposed to said direction from which said radio wave is coming.

26. An antenna structure for receiving a radio wave which includes at least a magnetic core and a coil unit provided in at least a part of said magnetic core, said antenna structure characterized in that said antenna structure includes a main magnetic path wherein a coil is wound about said magnetic core and a sub-magnetic path wherein said coil is not wound about said magnetic core, a magnetic path formed along said magnetic core forming a configuration having a closed loop like configuration, and a maximum gain reduction ratio of a gain value shown by said antenna structure in a case where a metal object is present in the vicinity of said antenna structure to a gain value shown by said antenna structure in a case where said metal object is absent in the vicinity of said antenna structure, is not more than 60%.

27. An antenna structure according to claim 26, wherein said metal object including at least one of a dial plate of a timepiece, an outer casing, a motor, a movement, a battery, a solar battery, a wrist band, a heat sink, a microcomputer, a gear train, and said like.

28. An antenna structure according to claim 26, wherein said metal object is arranged at a position located with a certain distance from said antenna structure to which a magnetic flux output therefrom in a state wherein said sub-magnetic path is not added to

said antenna structure can reach when said antenna structure receives said radio wave to produce resonance, and said metal object having a function of absorbing said magnetic flux.

29. (Amended) An antenna structure for being able to receive a radio wave and which is arranged in a timepiece wherein at least one of a side section and a bottom cover section thereof is made of a metal material, said antenna structure being characterized in that an L value of said antenna structure is not more than 1600 mH and winding resistance of said antenna structure is not more than 1 KΩ.

30. (Amended) An antenna structure according to claim 29, wherein said L value is not more than 800 mH and said winding resistance of said antenna is not more than 1 KΩ.

31. (Amended) An antenna structure according to claim 29, wherein said L value is not more than 220 mH and said winding resistance of said antenna is not more than 1 KΩ.

32. (Cancelled)

33. (Cancelled)

34. (Cancelled)

35. (Amended) An antenna structure according to claim 2, wherein said antenna structure which being able to receive a radio wave is arranged in a timepiece wherein at least one of a side section and a bottom cover section is made of a metal material, and said number of turns of said antenna is not lower than 400.

36. (Amended) An antenna structure according to any one of claims 29 to 31, wherein said number of turns is not lower than 1000.

37. (Amended) An antenna structure according to any one of claims 29 to 31 and 36, wherein a diameter of a winding wire is not more than 0.11 mmϕ.

38. (Amended) An antenna structure according to any one of claims 29 to 31 and 35 to 37, wherein said antenna structure for receiving said radio wave to be used inside a metal outer casing, said antenna structure comprises a main magnetic path wherein a coil is wound about a magnetic core and a sub-magnetic path wherein said coil is not wound about said magnetic core, said magnetic path formed along said magnetic core having a configuration of a closed loop like

configuration, a gap is provided in a part of said magnetic path of said antenna structure having said closed loop like configuration, said gap is configured so as to have magnetic resistance or magnetic permeability which being different from magnetic resistance or magnetic of other part of said magnetic path other than said gap, and said antenna structure having a structure wherein a magnetic flux caused by an external radio wave coming into said metallic outer casing can be received but said magnetic flux generated by resonance hardly leaks to an outside of said magnetic path.

39. An antenna structure which receives a radio wave and comprising at least a magnetic core portion and a coil portion which is provided on at least one portion of said magnetic core portion, wherein, said antenna structure including a main magnetic path wherein a coil is wound about said magnetic core and a sub-magnetic path wherein said coil is not wound about said magnetic core, said magnetic path along said magnetic core forming a configuration having a closed loop like configuration, said antenna structure being suitable to be used under circumstances wherein a metal material is present in the vicinity of said antenna structure, and a Q value retention ratio Rq defined below, in a case where said metal object is present in the vicinity of said antenna structure, is not lower than 10%,

wherein said Q value retention ratio Rq is expressed by said following equation:

$$Rq = Q_{mL}/Q_{..} \times 100,$$

where, the Q value of the antenna structure is set to $Q_{..}$ in the case where the antenna structure is placed under an environment in which the antenna structure is not disposed in contact with the metal object or the metal object is absent in the vicinity of the antenna structure, and a Q values of the antenna structure are measured and set to Q_{m} in an environment where the antenna structure is disposed in contact with the metal object or the metal object is disposed in the vicinity of the antenna structure, and then the most lowest Q_{m} value is selected as Q_{mL}.

40. An antenna structure according to claim 39, wherein said Q

value showing said minimum value in said Q values, wherein a plurality of kinds of metal objects made of different metal materials are measured under said same condition, is selected as said minimum value Q_{NL} of said Q value of said antenna structure.

41. An antenna structure according to claim 40, wherein said minimum value Q_{NL} of said Q value of said antenna structure is a value which is measured under circumstances, wherein a metal object made of stainless steel (SUS), titanium, or a titanium alloy is connected to said antenna structure or said metal object is arranged in said vicinity of said antenna structure.

42. An antenna structure according to any one of claims 1 to 28, 39 to 41, wherein said magnetic path forming said closed loop like configuration, is said magnetic path which said magnetic flux generated by resonance passes through.

43. A radio control timepiece which comprises a reference signal generating means for outputting a reference signal; a time keeping means for outputting time keeping information on the basis of said reference signal; a displaying means for displaying a time information on the basis of said time keeping information; a receiving means for receiving standard radio wave having reference time information and a time information correction means for correcting the output time information output from said time keeping means based on the receiving signal received from a receiving means, and wherein said receiving means including an antenna structure having the structure defined by any one of claims 1 to 42.

44. A radio control timepiece according to claim 43, wherein said radio control timepiece has an outer casing unit which is made of said metal material.

45. A radio control timepiece according to claim 44, wherein at least one of said side section and said bottom cover section is made of said metal material.

46. A radio control timepiece according to any one of claims 43 to 45, wherein said main magnetic path of said antenna structure is arranged in an outer periphery of said radio control timepiece and said sub-magnetic path is arranged inside said main magnetic path

relative to said outer periphery of said radio control timepiece.

47. A radio control timepiece according to any one of claims 43 to 46, wherein said antenna structure is provided on a surface of a dial plate of said radio control timepiece, said surface being opposite to another surface thereof which is facing to a windshield.

48. A radio control timepiece according to any one of claims 43 to 47, wherein said antenna structure is provided in said radio control timepiece, and further wherein at least a part of the portion of said sub-magnetic path of said antenna structure and which opposing to said outer casing unit of said radio control timepiece is covered with said main magnetic path.